<center>REMARKS</center>

Applicants thank the Patent Office for the careful consideration accorded this Application and respectfully request reconsideration in view of the Amendment above and remarks set forth below.

Applicants have canceled Claims 152-171 without prejudice or disclaimer and have added new Claims 172-186 directed towards a novel method of servicing query statements using a database management system (DBMS) employing a relational data store and a multi-dimensional data base (MDDB), in a manner transparent to client machines.

Support for the RDBMS defined by Claim 172-186 is set forth in Figs. 19A through 22 and elsewhere throughout Applicants' Patent Specification.

Applicants enclose herewith a Supplemental Information Disclosure Statement (SIDS) for consideration and entry in the present Application.

As claimed, the RDBMS of Claim 172 includes a query interface for receiving query statements from or more client machines, and generating one or more query requests by disintegrating the query statement so that each query request specifies a set of dimensions. The RDBMS also includes a query processing mechanism for processing each received query statement, and determining how to service query requests with data available to the RDBMS.

The RDBMS of the claimed invention also includes a multi-dimensional database (MDDB) having a multi-dimensional data structure for storing aggregated (multi-dimensional) fact data, as well as a relational data store having relational tables for storing fact data and a meta-data store for storing a dictionary containing dimension data.

As claimed, in situations when the query processing mechanism determines servicing one or more query requests requires fact data stored in the relational tables of the relational data store, the query handling mechanism automatically routes one or more query requests to the

relational data tables so that data can be accessed from the relational tables and forwarded to the query processing mechanism for use in servicing the one or more query requests, in a manner transparent to the client machine.

In situations when query processing mechanism determines servicing one or more query requests requires aggregated fact data stored in the multi-dimensional data structure of the MDDB, the query handling mechanism automatically routes the one or more query requests to the MDDB so that aggregated fact data can be accessed from the MDDB and forwarded to the query processing mechanism for use in servicing the query requests, in a manner transparent to the client machine submitting the query to the query interface.

Applicants firmly believe that the prior art does not disclose, teach or suggest the RDBMS of the present invention, as claimed.

In (Prior Art) Fig. 15 of Applicants' Patent Specification, a conventional data warehouse is shown with a conventional MDDB OLAP (MOLAP) system (upper right hand side of Fig. 15), and a relational OLAP (ROLAP) system (lower right hand side of Fig. 15). As shown, the MOLAP system is realized as a separate system from the relational ROLAP system employed therein. Thus, in conventional data warehouses, there are typically two (2) different sets of query interfaces and two different sets of query processing logic that must be mastered by users of conventional data warehouses.

In a conventional ROLAP system, a query is submitted to a ROLAP engine. End users submit analyses to the ROLAP engine, which transforms the requests into SQL execution plans submitted to the relational database for processing. In ROLAP systems, aggregated data is stored in relational summary tables. A conventional ROLAP system used in a data warehouse often includes optimizations to support OLAP processing directly from relational databases.

In contrast with ROLAP (which services queries using aggregated data stored in relational summary tables), a conventional MOLAP system is based on a different architecture, i.e. one which permits the servicing of OLAP queries using aggregated data stored in a multi-

dimensional database (MDDB). However, as can be seen in the data warehouse of Fig. 15 (Prior Art) and mentioned above, the MOLAP component requires a query interface, analytical processing logic and a GUI, which is separate from and different than that used in the ROLAP subsystem. This increases the cost and complexity of conventional data warehouses. Additionally, an end-user must utilize query tools compatible with the two different query interfaces, analytical processing logic, and GUIs of the two different systems, further increasing the burden on the end user.

As described in the background of Applicants' Patent Specification, conventional ROLAP and MOLAP systems each have different advantages and disadvantages. As described in Applicants' Background of Invention, a shortcoming of prior art data warehouses is that separate ROLAP and MOLAP systems are required, each having separate query processing logic and separate query interfaces, resulting in increased cost and difficulty of use by end users, as described in the Present Specification. In a conventional data warehouse, there is a unidirectional flow of base/fact data from the RDBMS to the MDDB OLAP. Consequently, MOLAP aggregation results are only accessible from the MOLAP system.

Prior to Applicants' claimed invention, conventional data warehouse arrangements required end users to master two (2) different kinds of OLAP systems, query interfaces and logic processing tools, thereby significantly increasing the burden on end-users and requiring them to switch between different systems, query interfaces, and query tools, when needing different kinds of data to service queries. The RDBMS of the claimed invention effectively solves this problem.

Applicants respectfully submit that the prior art of record, when taken alone or in combination with each other (including US Patent No. 6,385,301 to Nolting et al), does not disclose, teach or suggest the RDBMS of the claimed invention or its claimed functions, wherein, when servicing query statements provided to its query interface, its query handling mechanism automatically routes one or more query requests to a MDDB so that aggregated fact data can be accessed therefrom and forwarded to its query processing mechanism for use in servicing the given query statement, in a manner transparent to the client machine, as claimed.

In contrast, Figs. 1 and 2B of US Patent No. 6,385,301 to Nolting et al show a telephone network traffic monitoring system which employs a conventional MOLAP subsystem. In this prior art system, its OLAP MDDB 80 and query interface terminal 9 are positioned as a front end between the client user and an RDBMS 60 which stores and supplies "phone call" base/fact data for aggregation within the OLAP MDDB 80 during OLAP operations.

Nolting et al's prior art MOLAP system architecture is clearly characterized in Fig. 15 (Prior Art) of the Background of Invention in Applicants' Patent Specification, and represents one of the major problems which Applicants' claimed invention solves (i.e. by providing a RDBMS which is capable of servicing query requests through a query interface, using aggregated fact data stored in a multi-dimensional database (MDDB) and accessed therefrom to service the query requests in a manner transparent to client machine).

In Nolting's conventional MOLAP architecture shown in Fig. 1 of US Patent No. 6,385,301, there is a uni-directional flow of all queries (i.e., studies/reports) from the user terminal 9 which serves as the front-end of the Nolting system. Also, there is also a unidirectional flow of fact data from the relational database (RDBMS) to the OLAP MDDB 80, where aggregation occurs, and on which query reports are made within the MDDB 80, during online analytical processing. Consequently, when using the Nolting MOLAP system, users are forced to submit all queries through its MOLAP query interface (85 in Fig. 2B) and all such queries can only be serviced by aggregated data stored in the MDDB 80. Also, it is noted that the query interface (85) supporting MOLAP services in the Nolting et al system is incapable of servicing queries (provided to it) using fact data stored in the relational data store of relational database 60.

In summary, when taken alone or together in combination with each other, US Patent No. 6,385,301 to Nolting et al and all other prior art references or record, fail to disclose, teach or suggest the RDBMS defined by independent Claim 172, wherein

(i) when the query processing mechanism determines that servicing the one or more query requests requires fact data stored in the relational tables of the relational data store,
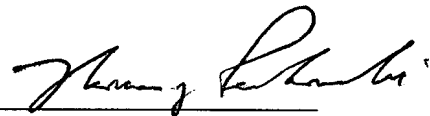
then the query handling mechanism automatically routes the one or more query requests to the relational data store so that fact data can be accessed from the relational tables and forwarded to the query processing mechanism for use in servicing the query requests, in a manner transparent to the client machine; and

(ii) when the query processing mechanism determines that servicing the one or more query requests requires aggregated fact data stored in the multi-dimensional data structure of a MDDB, then the query handling mechanism automatically routes the one or more query requests to the MDDB so that aggregated fact data can be accessed from the MDDB and forwarded to the query processing mechanism for use in servicing the query requests, in a manner transparent to the client machine.

In view of the present Amendment, Applicants firmly believe that the RDBMS of the present invention defined by the rewritten Claims 172-186 is neither anticipated by, nor rendered obvious in view of the prior art of record, and that the present application is now in condition for allowance.

Favorable action is earnestly solicited.
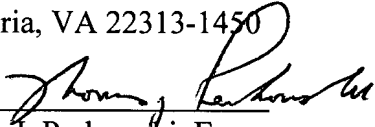
Respectfully submitted,

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